CLAIMS

I claim:

1. A method for obtaining apomictic plants from sexual plants comprising the steps of:

(a) obtaining at least two sets of delineated lines from a plant species or group of related plant species that are differentiated by their flowering responses to various photoperiods and by their start times and durations of female developmental stages relative to development of nongametophytic ovule and ovary tissue; and

(b) hybridizing said sets of delineated lines and selecting hybrid lines that contain genetic material of each said set of delineated lines such that asynchronous floral development, and therefore apomixis, is conferred.

2. The method of claim 1 wherein the differentiation in flowering response occurs within a member of the group consisting of short-day plants, long-day plants, dual-day-length plants, intermediate-day-length plants, and ambiphotoperiodic plants.

3. The method of claim 1 wherein the differentiation in flowering response occurs across at least one member of the group consisting of short-day plants, long-day plants, dual-day-length

plants, intermediate-day-length plants, ambiphotooperiodic plants, and day-neutral plants.

4. The method of claim 1 wherein differentiation of flowering responses to various photoperiods is obtained by plant breeding.

5. The method of claim 1 wherein differentiation in start times and durations of female developmental stages occurs within a member selected from the group consisting of archespore formation, megasporogenesis, megagametogenesis, and early embryony.

6. The method of claim 1 wherein differentiation in start times and durations of female developmental stages occurs across at least one member selected from the group consisting of archespore formation, megasporogenesis, megagametogenesis, and early embryony.

7. The method of claim 1 wherein differentiation in start times and durations of female developmental stages is obtained by plant breeding.

8. The method of claim 1 wherein nongametophytic ovule and ovary tissues comprise at least one member of the group consisting of nucellus, integument, pericarp, hypanthium, and pistil wall.

9. The method of claim 1 wherein the genetic material comprises genomes from each set of delineated lines that confer appropriate degrees of asynchrony as measured by the expression of apomixis.

10. The method of claim 1 wherein the genetic material comprises chromosomes from each set of delineated lines that confer appropriate degrees of asynchrony as measured by the expression of apomixis.

11. The method of claim 1 wherein the genetic material comprises genes from each set of delineated lines that confer appropriate degrees of asynchrony as measured by the expression of apomixis.

12. The method of claim 1 wherein said selected hybrid lines display a reproductive anomaly selected from the group consisting of apospory, diplospory, and polyembryony.

13. The method of claim 1 wherein said selected hybrid lines are genetically polyploid.

14. The method of claim 1 wherein said selected hybrid lines are genetically triploid.

15. The method of claim 1 wherein said selected hybrid lines are genetically aneuploid.

16. The method of claim 1 wherein said selected hybrid lines are genetically diploid.

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17. A method for obtaining apomictic plants from sexual plants comprising the steps of:

(a) identifying naturally-occurring divergence in flowering responses to various photoperiods within a plant species or group of related plant species;

(b) obtaining two sets of lines of said plant species or group of related plant species that are differentiated by their flowering responses to various photoperiods;

(c) identifying within and between said sets of lies divergence in start times and durations of female developmental

stages relative to development of nongametophytic ovule and ovary tissues;

(d) obtaining two sets of delineated liens of said species or group of related species that are differentiated by their flowering responses to various photoperiods and by their start times and durations of female developmental stages relative to development of nongametophytic ovule and ovary tissues; and

(e) producing hybrid lines that contain genetic material of each said set of delineated lines such that asynchronous floral development, and therefore apomixis, is conferred.

18. A method for obtaining aposporic, diplosporic, or polyembryonic plants from sexual monocotyledonous or dicotyledonous plants comprising the steps of:

(a) identifying naturally-occurring divergence in flowering responses to various photoperiods within a plant species or group of related plant species;

(b) obtaining two set of lines of said plant species or group of related plant species that are differentiated by their flowering responses to various photoperiods;

(c) identifying within and between said sets of lines divergence in start times and durations of female developmental stages selected from the group consisting of archespore

formation, megasporogenesis, megagametogenesis, and early embryony relative to the development of nongametophytic ovule and ovary tissues selected from the group consisting of nucellus, integument, pericarp, hypanthium, and pistil wall;

(d) obtaining two set of delineated lines of said species or group of related species that are differentiated by their

(i) flowering responses to various photoperiods such that divergence occurs within a member or across more than one member selected from the group consisting of short-day plants, long-day plants, dual-day-length plants, intermediate-day-length plants, ambiphotoperiodic plants, and day-neutral plants and

(ii) start times and durations of female developmental stages selected from the group consisting of archespore formation, megasporogenesis, megagametogenesis, and early embryony relative to the development of nongametophytic ovule and ovary tissues selected from the group consisting of nucellus, integument, pericarp, hypanthium, and pistil wall such that divergence occurs within one member or spans more than one member of such female developmental stages;

(e) producing polyploid, triploid, diploid, or aneuploid lines that contain genomes, chromosomes, or genes from teach said set of delineated lines such that apomixis is expressed.

19. A method for producing apomictic plants from two or more sexual plants of the same or related species comprising the steps of:

(a) obtaining two sexual lines whose female reproductive phenotypes differ such that under similar environmental conditions asynchrony in female developmental schedules between the two lines occurs;

(b) making amphiploids by chromosome doubling of the sexual lines differing in female developmental schedules if said lines are not already polyploid; and

(c) hybridizing the two sexual lines to induce apomixis.

20. The method of claim 19 wherein step (c) precedes step (b).

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